Development of mathematically-defined surfaces

Luke D Todhunter[1], Richard Leach[1], Simon Lawes[1], Peter Harris[2] and François Blateyron[3]
[1]Manufacturing Metrology Team, Faculty of Engineering, University of Nottingham, UK
[2]National Physical Laboratory, Teddington, UK
[3]Digital Surf, Besançon, France

New software has been developed that enables the creation of areal surface topography representations. The goal of this software package is to utilise the mathematically-defined surface representations in the development of surface texture parameter reference values. These surface texture parameter reference values will be compared against parameter values obtained by third-parties to assess the performance of their software. The reference values will be obtained from the calculation of parameters for a mathematically defined surface, to reduce some of the uncertainty associated with current reference standards, which are calculated from discrete surface representations. The software utilises exponential terms and the Fourier series to produce mathematical functions that describe a simulated areal surface. The software features a graphical user interface (GUI) that enables easy navigation, and allows users to customise the surface to create the topography they require. The GUI allows users to specify the size of the areal surface, and create the surface through one of two methods: either by building the surface manually through a summation of cosine terms, or by utilising a combination of pre-defined mathematical functions. The software allows the user to export the resulting surface as a mathematical equation written in a .TXT file, or as a discrete representation in the form of a dataset in the standardised .SDF file-type.